



Programmation Android

I. Introduction

Plan

- 1 **Introduction**
- 2 **La plate-forme Android**
- 3 **Programmation Android**
- 4 **Hello World avec Android Studio**
- 5 **Édition du projet avec Android Studio**
- 6 **Exécution du projet**

Plan

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Application mobile

[► wikipédia](#)

Caractéristiques

- Cible : **appareils électroniques mobiles autonomes** (smartphone, tablette, etc.)
- ⇒ **Contexte logiciel hétérogène** :
 - **non connecté** : pas d'accès réseau / connectivité limitée...
 - **connecté** : LAN / WAN ...
 - **localisé (ou non)** : **GPS**, géolocalisation IP !
 - ...
- ⇒ **Contexte matériel hétérogène** :
 - **ressources plus faibles** : CPU / RAM / DD / ROM
 - ⇒ la **consommation** des ressources doit être **minimale**
 - ⇒ **Résolutions d'affichage hétéroclites** ⇒ **GUI adaptative**
 - ...

Application capable de s'adapter au contexte

Application mobile

Principaux OS

- **Android** (Google) : Linux, version 13 (août 2022)
- **iOS** (Apple) noyau hybride XNU : Mach(libre) + BSD (Unix)
- **LineageOS** Android dégooglisé, V. 20 (décembre 2022)
- **Tizen** (*Linux Foundation*), supporté par Samsung (montres connectées)
- **Librem 5** (*Purism, PureOS*), vie privée / sécurité)
- **Windows 10 mobile** (Microsoft) (arrêté en octobre 2017)
- **Ubuntu Touch** (Canonical) : Linux (arrêté en avril 2017)
- **BlackBerry OS, QNX** : Unix (arrêté en 2015)
- **Firefox OS** (Mozilla Corporation) : Linux (arrêté en 2015)
- [▶ plus d'information](#)

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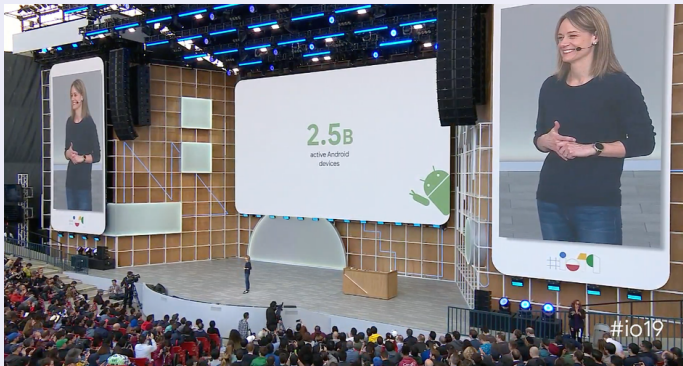
Android

Origine

- Initialement un OS pour appareil photo
- Acheté par Google en 2005
- [► Wikipédia](#)

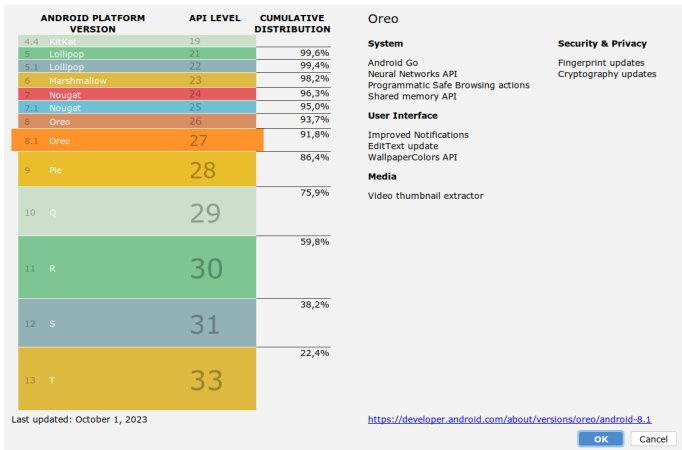
Diffusion

Google I/O, mai 2019



2022 ⇒ 3.3 milliards

Nombre d'utilisateurs des différentes versions (accès au Play Store)



Oreo

System

Android Go
 Neural Networks API
 Programmatic Safe Browsing actions
 Shared memory API

User Interface

Improved Notifications
 EditText update
 WallpaperColors API

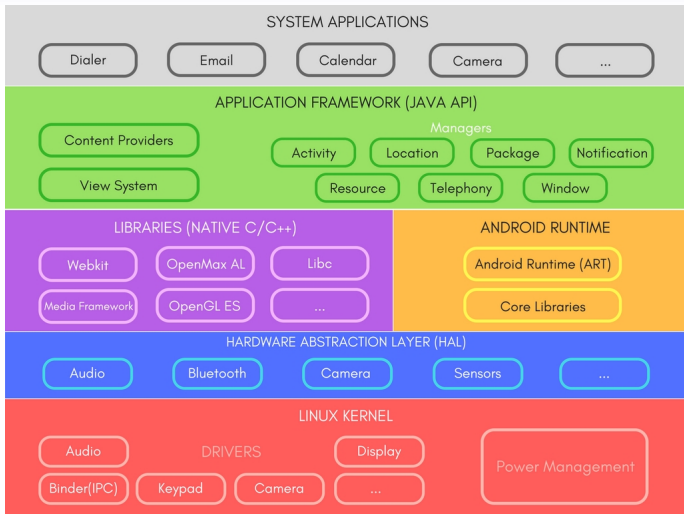
Media

Video thumbnail extractor

Security & Privacy

Fingerprint updates
 Cryptography updates

Architecture globale

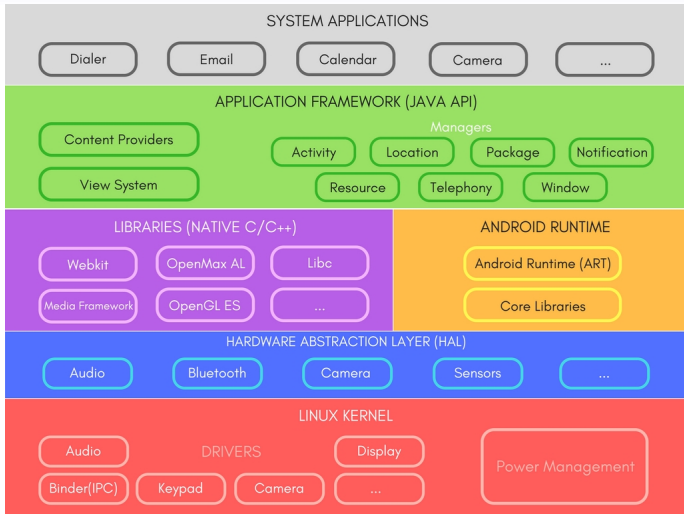


Libraries

Librairies C/C++ libres ⇒

- **Surface Manager** : affichage 2D/3D
- **Media Framework** : codecs basés sur librairie OpenCORE
- **SQLite** : moteur de base de données relationnelle
- **OpenGL|ES** : implémentation OpenGL pour l'embarqué
- **FreeType** : rendu bitmap de polices vectorielles
- **WebKit** : moteur de rendu de pages Web
- **SGL** : moteur graphique 2D
- **SSL** : communications réseaux sécurisées
- **libc** : dérivé de la librairie C (BSD) pour l'embarqué (Bionic libc)

Architecture : Application Framework



Application framework 1/2

Modules ⇒

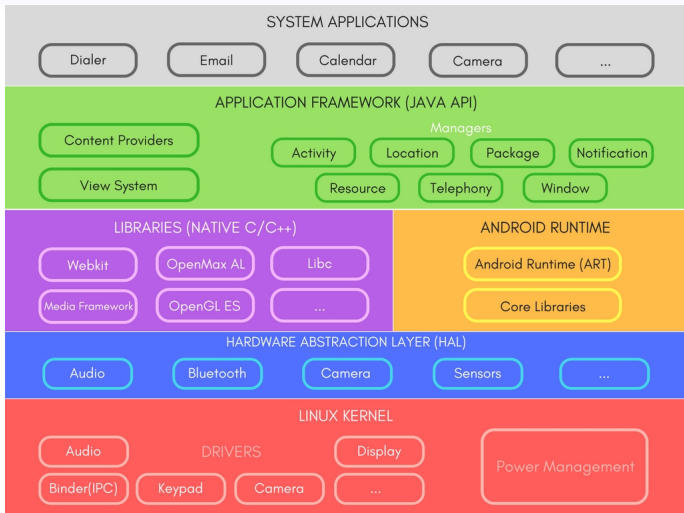
- **Content Providers** : gestion de l'accès aux données (appli et autres applis)
- **View System** : gestion des composants graphiques et des événements utilisateurs liés
- **Activity Manager** : cycle de vie et navigation entre applications
- **Location Manager** : accès aux fonctions de localisation

Application framework 2/2

Modules ⇒

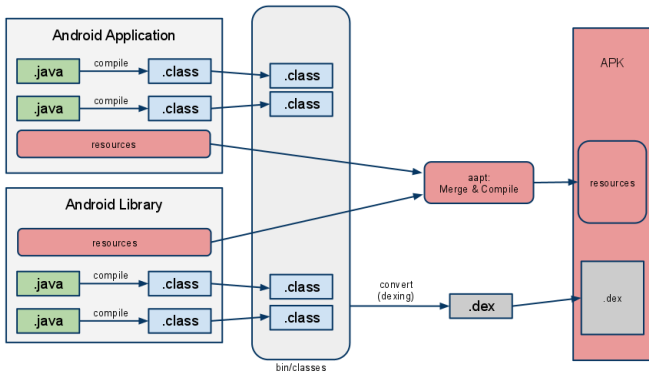
- **Package Manager** : accès aux API tierces installées
- **Notification Manager** : gestion du système de notifications
- **Resource Manager** : gestion des ressources (images, définition des layouts, etc.)
- **Telephony Manager** : accès aux services de téléphonie
- **Window Manager** : gestion GUI (z-ordered, mise en page, etc.)

Architecture : Android Runtime



Construction d'un APK

APK : Android package, archive contenant les ressources nécessaires à l'exécution d'une application Android



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Prérequis de la programmation Android

Connaissances Techniques

- Android (runtime + framework) \Rightarrow **POO + Java** / Kotlin

Android *Command line tools*

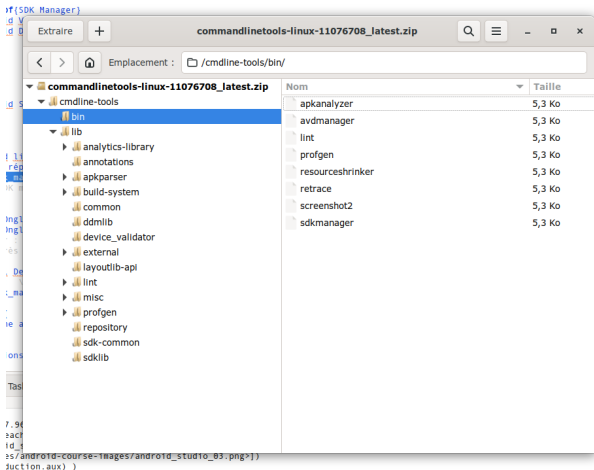
- Android **SDK Manager**
- **Android Virtual Device** Manager (AVD)
- **Android Debug Bridge** (adb) ...

Un IDE

- **Android Studio** [▶ téléchargement](#) / Eclipse

Command line tools (archive zip)

Décompression dans un répertoire, *e.g.* Android-sdk.
Répertoire référencé **SDK_PATH** dans la suite



SDK Manager

Onglet SDK tools

Appearance & Behavior > System Settings > Android SDK Reset

Manager for the Android SDK and Tools used by the IDE

Android SDK Location: [Edit](#) [Optimize disk space](#)

SDK Platforms SDK Tools SDK Update Sites

Below are the available SDK developer tools. Once installed, the IDE will automatically check for updates. Check "show package details" to display available versions of an SDK Tool.

Name	Version	Status
<input checked="" type="checkbox"/> Android SDK Build-Tools 32.1-rc1		Installed
<input type="checkbox"/> NDK (Side by side)		Not Installed
<input type="checkbox"/> Android SDK Command-line Tools (latest)		Not Installed
<input type="checkbox"/> CMake		Not Installed
<input type="checkbox"/> Android Auto API Simulators	1	Not installed
<input type="checkbox"/> Android Auto Desktop Head Unit Emulator	1.1	Not installed
<input checked="" type="checkbox"/> Android Emulator	30.4.5	Update Available: 31.2.8
<input checked="" type="checkbox"/> Android SDK Platform-Tools	31.0.0	Update Available: 32.0.0
<input type="checkbox"/> Google Play APK Expansion library	1	Not installed
<input type="checkbox"/> Google Play Instant Development SDK	1.9.0	Not installed
<input type="checkbox"/> Google Play Licensing Library	1	Not installed
<input type="checkbox"/> Google Play services	49	Not installed
<input type="checkbox"/> Google Web Driver	2	Not installed
<input type="checkbox"/> Layout Inspector image server for API 29-30	6	Not installed
<input type="checkbox"/> Layout Inspector image server for API S	3	Not installed

Hide Obsolete Packages Show Package Details

? Project-level settings will be applied to new projects OK Cancel Apply

SDK Manager

Onglet SDK platform : APIs Android

Appearance & Behavior > System Settings > Android SDK

Manager for the Android SDK and Tools used by the IDE

Android SDK Location: [Edit](#) [Optimize disk space](#)

[SDK Platforms](#) [SDK Tools](#) [SDK Update Sites](#)

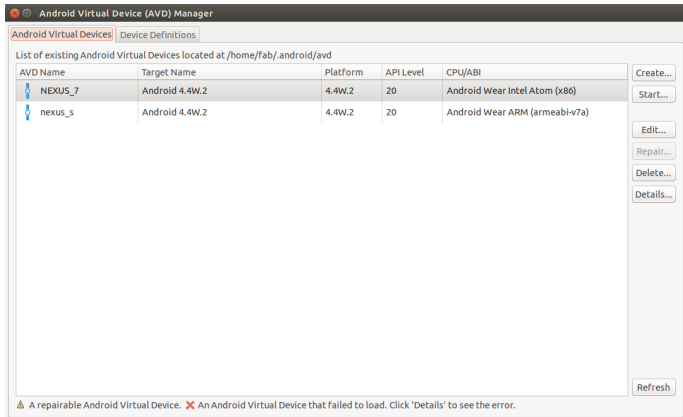
Each Android SDK Platform package includes the Android platform and sources pertaining to an API level by default. Once installed, the IDE will automatically check for updates. Check "show package details" to display individual SDK components.

Name	API Level	Revision	Status
<input type="checkbox"/> Android API 32	32	1	Not installed
<input type="checkbox"/> Android 12.0 (S)	31	1	Not installed
<input type="checkbox"/> Android 11.0 (R)	30	3	Update available
<input checked="" type="checkbox"/> Android 10.0 (Q)	29	5	Installed
<input type="checkbox"/> Android 9.0 (Pie)	28	6	Not installed
<input type="checkbox"/> Android 8.1 (Oreo)	27	3	Partially installed
<input type="checkbox"/> Android 8.0 (Oreo)	26	2	Not installed
<input type="checkbox"/> Android 7.1.1 (Nougat)	25	3	Not installed
<input type="checkbox"/> Android 7.0 (Nougat)	24	2	Not installed
<input type="checkbox"/> Android 6.0 (Marshmallow)	23	3	Not installed
<input type="checkbox"/> Android 5.1 (Lollipop)	22	2	Not installed
<input type="checkbox"/> Android 5.0 (Lollipop)	21	2	Not installed
<input type="checkbox"/> Android 4.4W (KitKat Wear)	20	2	Not installed
<input checked="" type="checkbox"/> Android 4.4 (KitKat)	19	4	Installed
<input type="checkbox"/> Android 4.3 (Jelly Bean)	18	3	Not installed
<input type="checkbox"/> Android 4.2 (Jelly Bean)	17	3	Not installed
<input type="checkbox"/> Android 4.1 (Jelly Bean)	16	5	Not installed
<input type="checkbox"/> Android 4.0.3 (IceCreamSandwich)	15	5	Not installed
<input type="checkbox"/> Android 4.0 (IceCreamSandwich)	14	4	Not installed
<input type="checkbox"/> Android 3.2 (Honeycomb)	13	1	Not installed

Hide Obsolete Packages Show Package Details

? Project-level settings will be applied to new projects OK Cancel Apply

Android Virtual Device Manager (AVD)



The screenshot shows the Android Virtual Device (AVD) Manager window. The title bar reads "Android Virtual Device (AVD) Manager". Below the title bar, there are two tabs: "Android Virtual Devices" (selected) and "Device Definitions". The main area displays a list of existing AVDs located at `/home/fab/.android/avd`. The list has the following columns: AVD Name, Target Name, Platform, API Level, and CPU/ABI. There are two entries in the list:

AVD Name	Target Name	Platform	API Level	CPU/ABI
NEXUS_7	Android 4.4W.2	4.4W.2	20	Android Wear Intel Atom (x86)
nexus_s	Android 4.4W.2	4.4W.2	20	Android Wear ARM (armeabi-v7a)

To the right of the table, there are several buttons: "Create...", "Start...", "Edit...", "Repair...", "Delete...", and "Details...". At the bottom right, there is a "Refresh" button. Below the table, there is a legend: a green triangle icon for "A repairable Android Virtual Device" and a red X icon for "An Android Virtual Device that failed to load. Click 'Details' to see the error."

Outils requis

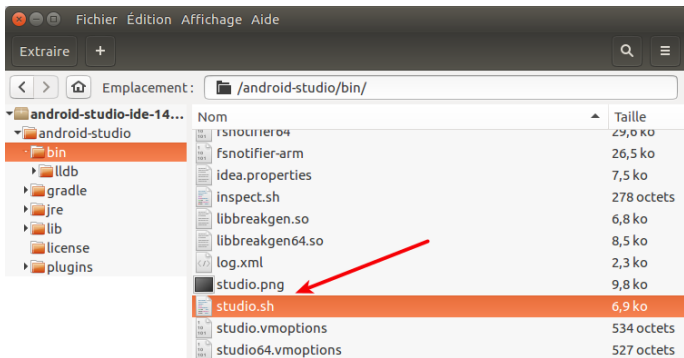
IDE pour programmer une application Android :

2 solutions :

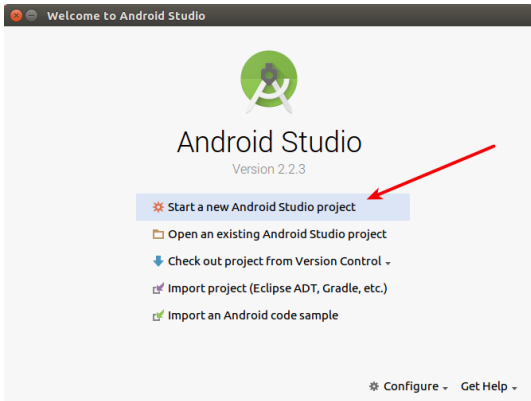
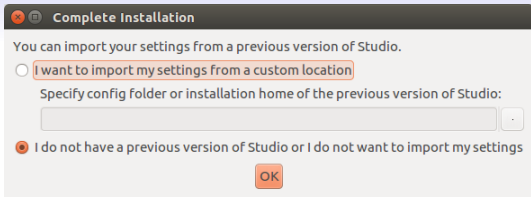
- Eclipse avec le plugin **Andmore** : [taper android dans le marketplace d'Eclipse](#)
- **Android Studio** (supporté par Google) : <https://developer.android.com/studio>

Android Studio

Peut être installé avec un paquet ou téléchargé
Contenu de l'archive (téléchargera tout le reste : tools, sdk, etc.)



Android Studio

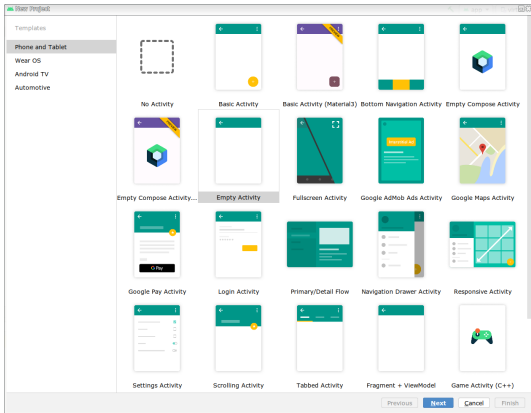


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New project 1

Choix du squelette de l'activité principale



New project 2

Caractéristiques principales

Empty Activity

Creates a new empty activity

Name

Package name

Save location

Language

Minimum SDK

i Your app will run on approximately **96,2%** of devices.
[Help me choose](#)

Use legacy android.support libraries ⓘ
Using legacy android.support libraries will prevent you from using the latest Play Services and Jetpack libraries

New project 3

Sélection de l'API Minimum

ANDROID PLATFORM VERSION	API LEVEL	CUMULATIVE DISTRIBUTION
4.4 Kitkat	19	
5 Lollipop	21	99,6%
5.1 Lollipop	22	99,4%
6 Marshmallow	23	98,2%
7 Nougat	24	96,3%
7.1 Nougat	25	95,0%
8 Oreo	26	93,7%
8.1 Oreo	27	91,8%
		86,4%
9 Pie	28	
		75,9%
10 Q	29	
		59,8%
11 R	30	
		38,2%
12 S	31	
		22,4%
13 T	33	

Last updated: October 1, 2023

Oreo

System

- Android Go
- Neural Networks API
- Programmatic Safe Browsing actions
- Shared memory API

User Interface

- Improved Notifications
- EditText update
- WallpaperColors API

Media

- Video thumbnail extractor

Security & Privacy

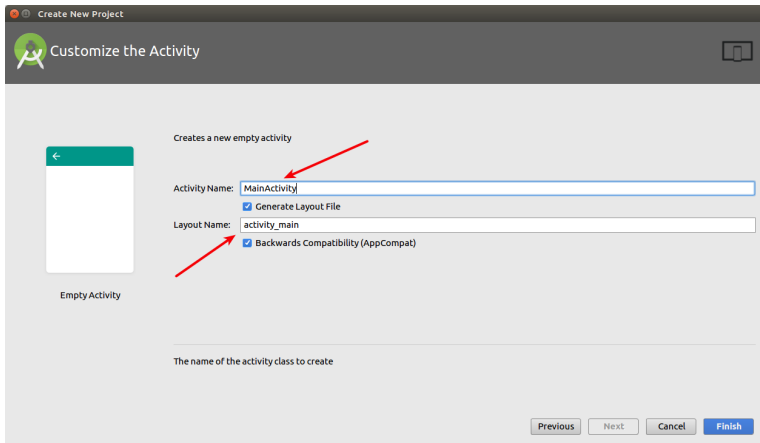
- Fingerprint updates
- Cryptography updates

<https://developer.android.com/about/versions/oreo/android-8.1>

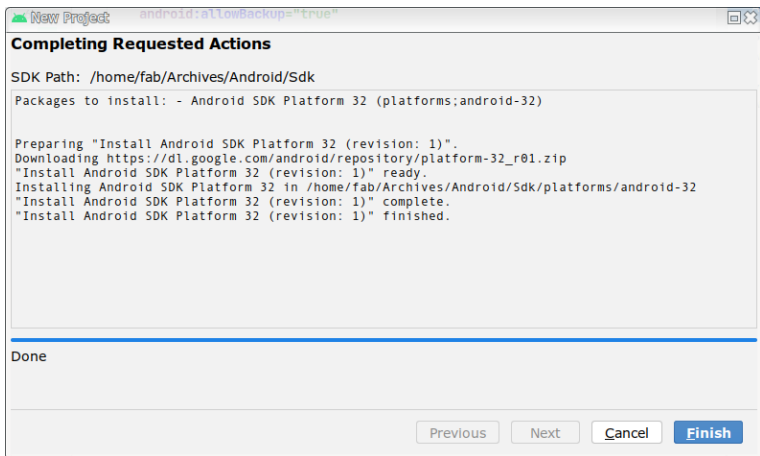
OK Cancel

Paramétrage des noms de fichiers

Ce choix n'est plus possible...



Téléchargement de l'API si nécessaire



Vue globale dans l'IDE

The screenshot shows the IDE interface for an Android project named 'Hello World'. The main editor displays the code for MainActivity.java, which is a subclass of AppCompatActivity. The code includes package declarations, imports for AppCompatActivity and Bundle, and an onCreate method that calls super.onCreate, setContentView, and sets the activity layout.

```
1 package org.fmichel.helloworld;
2
3
4 import androidx.appcompat.app.AppCompatActivity;
5 import android.os.Bundle;
6
7 public class MainActivity extends AppCompatActivity {
8
9     @Override
10    protected void onCreate(Bundle savedInstanceState) {
11        super.onCreate(savedInstanceState);
12        setContentView(R.layout.activity_main);
13    }
14 }
```

The left sidebar shows the project structure:

- app
 - manifests
 - java
 - org.fmichel.helloworld (selected)
 - org.fmichel.helloworld (androidTest)
 - org.fmichel.helloworld (test)
 - res
 - drawable
 - ic_launcher_background.xml
 - ic_launcher_foreground.xml (v24)
 - layout
 - activity_main.xml
 - mipmap
 - values
 - xml
- Gradle Scripts
 - build.gradle (Project: Hello_World)
 - build.gradle (Module: Hello_World.app)
 - gradle-wrapper.properties (Gradle Version)
 - proguard-rules.pro (ProGuard Rules for Release)
 - gradle.properties (Project Properties)
 - settings.gradle (Project Settings)

The bottom status bar shows: Gradle sync finished in 2 m 26 s 678 ms (4 minutes ago). The system tray shows: 14:2 L F UTF-8 4 spaces.

Contenu du projet

Dossier App

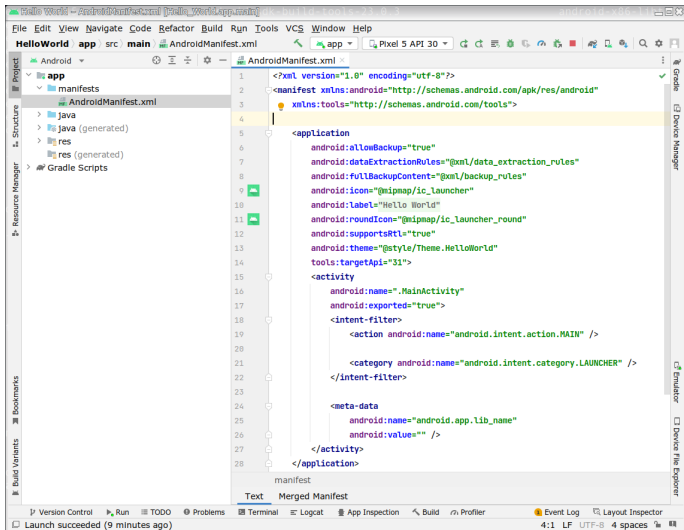
- **build/** : fichiers générés par le projet
- **libs/** : bibliothèques additionnelles ("à la main")
- **src/** : intégralité des sources pour le développement (appli + tests)
- **build.gradle** : définition des options du build
- **proguard-rules.pro** : règles additionnelles pour le build
- **.gitignore** : définition des fichiers ignorés par git

Contenu du projet

Dossier App/src/

- **androidTest/** : tests de l'application dans l'environnement android
- **test/** : tests internes à l'application
- **main** : sources de l'application
 - **main/java** : sources Java, e.g. la classe qui lance l'activité
 - **main/res** : les ressources de l'application
 - **drawable-(h)(m)(l)dpi/** images dans différentes résolutions
 - **layout/** GUI design général
 - **values/** valeurs des variables
 - **menu/** définition des menus
- **main/AndroidManifest.xml** : description et éléments-clés de l'application (nom, activité principale, intents, etc.)

app/src/main/AndroidManifest.xml : description



```
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3         xmlns:tools="http://schemas.android.com/tools">
4
5     <application
6         android:allowBackup="true"
7         android:dataExtractionRules="@xml/data_extraction_rules"
8         android:fullBackupContent="@xml/backup_rules"
9         android:icon="@mipmap/ic_launcher"
10        android:label="Hello World"
11        android:roundIcon="@mipmap/ic_launcher_round"
12        android:supportRtl="true"
13        android:theme="@style/Theme.HelloWorld"
14        tools:targetApi="31">
15        <activity
16            android:name=".MainActivity"
17            android:exported="true">
18            <intent-filter>
19                <action android:name="android.intent.action.MAIN" />
20
21                <category android:name="android.intent.category.LAUNCHER" />
22            </intent-filter>
23
24            <meta-data
25                android:name="android.app.lib_name"
26                android:value="" />
27        </activity>
28    </application>

```

manifest
Merged Manifest

Launch succeeded (9 minutes ago) 4:1 LF UTF-8 4 spaces

Manifest complet

The screenshot shows the AndroidManifest.xml file for a Hello World app. The file content is as follows:

```

<manifest
    android:versionCode="1"
    android:versionName="1.0"
    package="org.fisichel.helloworld"
    xmlns:android="http://schemas.android.com/apk/res/android" >
    <uses-sdk
        android:minSdkVersion="23"
        android:targetSdkVersion="32" />
    <application
        android:allowBackup="true"
        android:appComponentFactory="androidx.core.app.CoreComponentFacto
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportRtl="true"
        android:theme="@style/Theme.HelloWorld" >
        <activity
            android:exported="true"
            android:name="org.fisichel.helloworld.MainActivity" >
            <intent-filter
                <action
                    android:name="android.intent.action.MAIN" />
                <category
                    android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
            <meta-data
                android:name="android.app.lib_name"
                android:value="" />
        </activity>
    </application>
</manifest>

```

The right sidebar shows the following sections:

- Manifest Sources**
 - core:1.7.0 manifest
 - Hello_World.app main manifest (this file)
 - build.gradle manifest
- Other Manifest Files**

(Included in merge, but did not contribute any elements)

 - recyclerview:1.1.0 manifest, lifecycle-livedata-core:2.3.1 manifest, vectordrawable-animated:1.1.0 manifest, viewPager:1.0.0 manifest, appcompat-resources:1.4.1 manifest, constraintlayout:2.1.3 manifest, drawerlayout:1.1.1 manifest, fragment:1.3.6 manifest, versionedparcelable:1.1.1 manifest, documentfile:1.0.0 manifest, material:1.5.0 manifest, localbroadcastmanager:1.0.0 manifest, print:1.0.0 manifest, core-runtime:2.1.0 manifest, legacy-support-core-utils:1.0.0 manifest, dynamicanimation:1.0.0 manifest, cursoradapter:1.0.0 manifest, interpolator:1.0.0 manifest, transition:1.2.0 manifest, viewPager2:1.0.0 manifest, lifecycle-runtime:2.4.0 manifest, lifecycle-livedata:2.0.0 manifest, vectordrawable:1.1.0 manifest, appcompat:1.4.1 manifest, annotation-experimental:1.1.0 manifest, savedstate:1.1.0 manifest, lifecycle-viewmodel-savedstate:2.3.1 manifest, activity:1.2.4 manifest, lifecycle-viewmodel:2.3.1 manifest, loader:1.0.0 manifest, customview:1.1.0 manifest, cardview:1.0.0 manifest, coordinatorlayout:1.1.0 manifest

The bottom status bar shows: Launch succeeded (34 minutes ago)

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res/layout/activity_main.xml

disposition de la GUI

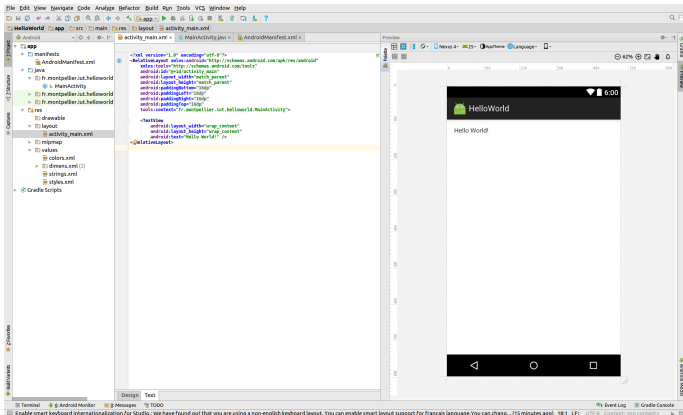
activity_main.xml

```
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:paddingBottom="@dimen/activity_vertical_margin"
    android:paddingLeft="@dimen/activity_horizontal_margin"
    android:paddingRight="@dimen/activity_horizontal_margin"
    android:paddingTop="@dimen/activity_vertical_margin"
    tools:context="com.example.fr.iutmontp.helloworld.MainActivity" >

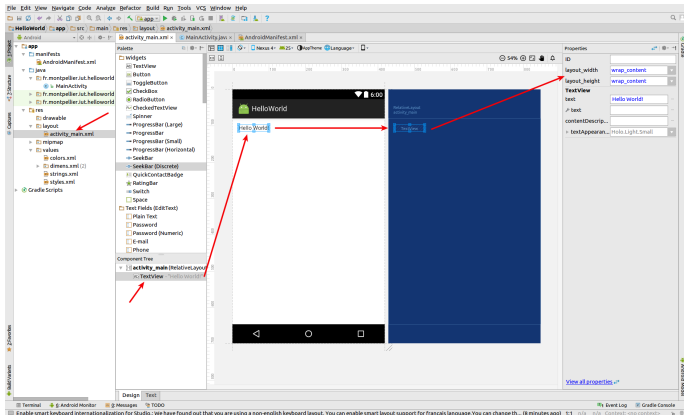
    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/hello_world" />

</RelativeLayout>
```

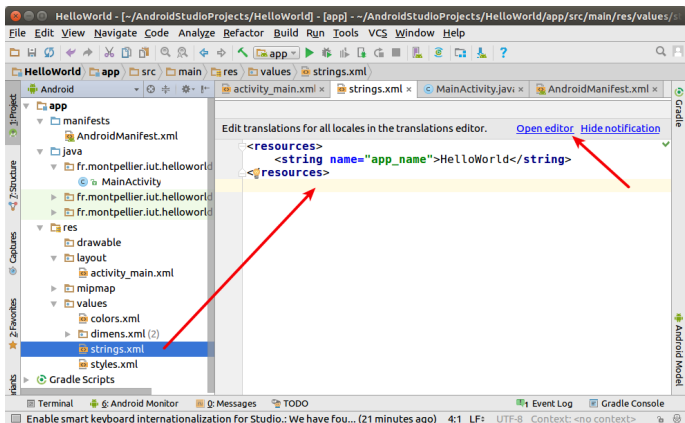
Éditeur de layout (*text mode*)



Éditeur de layout (*design mode*)



strings.xml : valeurs des variables



Éditeur pour *strings.xml*

The screenshot shows the Android Studio interface with the Strings Editor open. The editor displays a table with the following columns: Key, Default Value, and Untranslated. A red arrow points to the '+' icon to add a new key, another points to the 'Key' column, and a third points to the 'Default Value' column. The table contains one entry: 'app_name' with the value 'HelloWorld'. Below the table are input fields for Key, Default Value, and Translation.

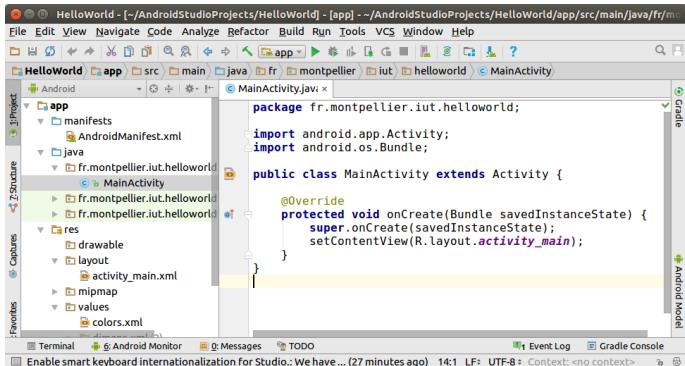
Key	Default Value	Untr...
app_name	HelloWorld	<input type="checkbox"/>

Key:

Default Value:

Translation:

/src/.../MainActivity.java : activité



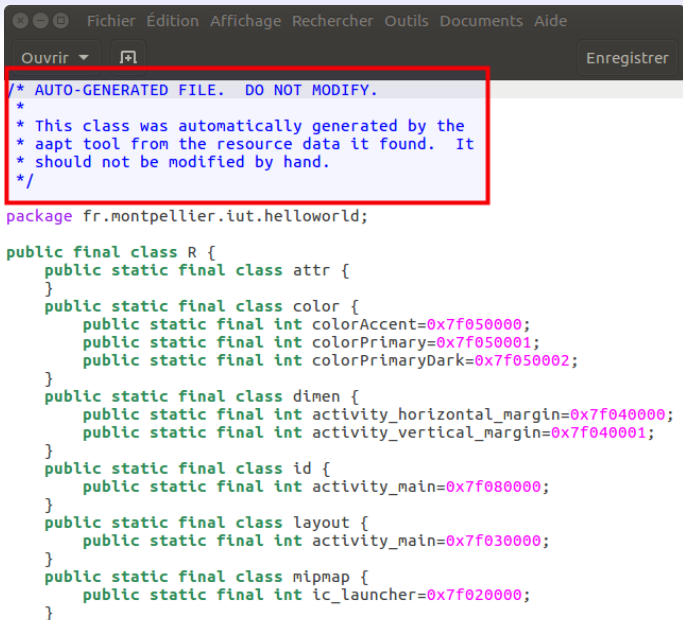
```
package fr.montpellier.iut.helloworld;

import android.app.Activity;
import android.os.Bundle;

public class MainActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```

/build/.../R.java : définition d'identifiants



```
Fichier Édition Affichage Rechercher Outils Documents Aide
Ouvrir [+] Enregistrer

/* AUTO-GENERATED FILE. DO NOT MODIFY.
 *
 * This class was automatically generated by the
 * aapt tool from the resource data it found. It
 * should not be modified by hand.
 */

package fr.montpellier.iut.helloworld;

public final class R {
    public static final class attr {
    }
    public static final class color {
        public static final int colorAccent=0x7f050000;
        public static final int colorPrimary=0x7f050001;
        public static final int colorPrimaryDark=0x7f050002;
    }
    public static final class dimen {
        public static final int activity_horizontal_margin=0x7f040000;
        public static final int activity_vertical_margin=0x7f040001;
    }
    public static final class id {
        public static final int activity_main=0x7f080000;
    }
    public static final class layout {
        public static final int activity_main=0x7f030000;
    }
    public static final class mipmap {
        public static final int ic_launcher=0x7f020000;
    }
}
```

Plan

- 1 Introduction
- 2 La plate-forme Android
- 3 Programmation Android
- 4 Hello World avec Android Studio
- 5 Édition du projet avec Android Studio
- 6 Exécution du projet

Exécution sur un vrai dispositif

Mise en place du dispositif pour le développement

- connexion usb : [drivers windows](#) [configuration linux](#)
- sous linux, la commande **lsusb** liste les connexions usb [plus d'information](#)
- activation *USB debugging* sur le dispositif :
à partir de Android 4.2 : Settings → About phone (7 tapes successives).

Exécution du projet

The screenshot shows the Android Studio IDE with the following components:

- Project View (Left):** Shows the project structure for 'SharingPicture'. The 'com.example.sharingpicture (androidTest)' package is selected.
- Device Manager (Top Right):** Displays a table of virtual devices. A tooltip 'Run \'app\' Maj+F10' is visible over the 'Run' button.
- Run Window (Bottom):** Shows the execution log for 'app' on a Nexus 4 API 30 device. The log indicates a successful launch followed by an error: 'Could not identify launch activity: Default Activity not found'.
- Notification Area (Right):** Contains two notifications: 'Project update recommended' and 'Android Studio and plugin updates available'.

Device	API	Size on Disk	Actions
Nexus 4 API 30 Android 11.0 Google APIs x86	30	9,8 GB	[Run] [Stop] [Edit]
Pixel_3a_API_30_x86 Android 11.0 Google APIs x86	30	9,9 GB	[Run] [Stop] [Edit]

```

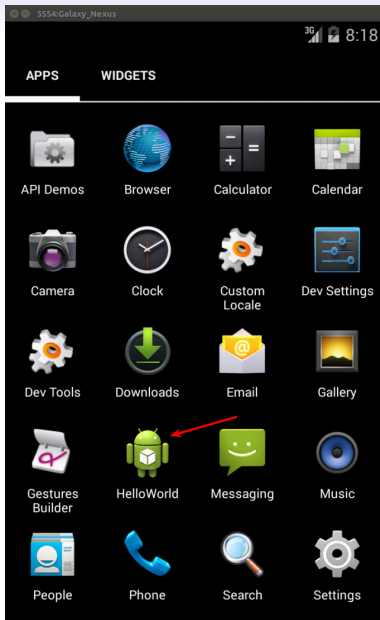
Run:
02/09 18:46:55: Launching 'app' on Nexus 4 API 30.
Install successfully finished in 3 s 95 ms.
Could not identify launch activity: Default Activity not found
Error while launching activity
Failed to launch an application on all devices
  
```

Notification: Project update recommended
Android Gradle Plugin can be [upgraded](#).

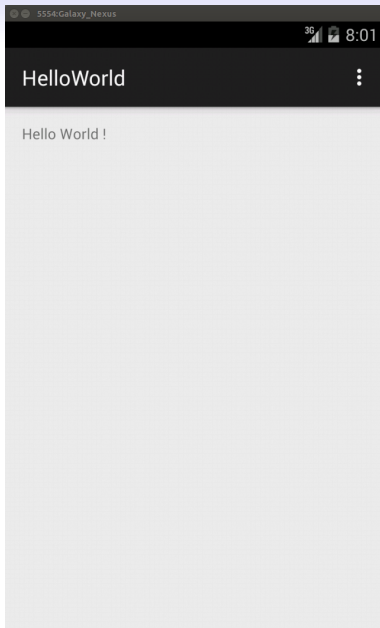
Notification: Android Studio and plugin updates available
Components: Android Emulator, Android SDK...
[Update...](#)

Run selected configuration 7:1 LF UTF-8 4 spaces

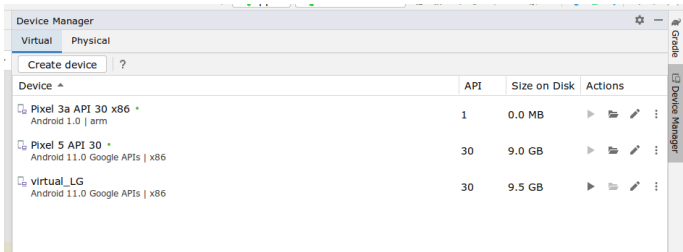
Une fois déployée



Résultat →



Exécution sur un émulateur avec AVD



Création d'une device virtuelle

Choix du modèle

Select Hardware

Choose a device definition

Category	Name	Play Store	Size	Resolution	Density
Phone	Resizable (Experimental)		6,0"	1080x2340	420dpi
Tablet	Pixel XL		5,5"	1440x2560	560dpi
Wear OS	Pixel 6 Pro		6,7"	1440x3120	360dpi
TV	Pixel 6		6,4"	1080x2400	420dpi
Automo...	Pixel 5		6,0"	1080x2340	440dpi
	Pixel 4a		5,8"	1080x2340	440dpi
	Pixel 4 XL		6,3"	1440x3040	560dpi
	Pixel 4	▶	5,7"	1080x2280	440dpi
	Pixel 3a XL		6,0"	1080x2160	400dpi
	Pixel 3a	▶	5,6"	1080x2220	440dpi
	Pixel 3 XL		6,3"	1440x2960	560dpi
	Pixel 3	▶	5,40"	1080x2160	440dpi
	Pixel 2 XL		5,99"	1440x2880	360dpi
	Pixel 2	▶	5,0"	1080x1920	420dpi
	Pixel	▶	5,0"	1080x1920	420dpi
	Nexus 5		4,0"	480x800	hdpi
	Nexus One		3,7"	480x800	hdpi
	Nexus 6P		5,7"	1440x2560	560dpi
	Nexus 6		5,96"	1440x2560	560dpi
	Nexus 3X	▶	3,2"	1080x1920	420dpi
	Nexus 5	▶	4,95"	1080x1920	xhdpi

New Hardware Profile Import Hardware Profiles

Pixel 2

Size: large
Ratio: long
Density: 420dpi

Clone Device...

Previous Next Cancel Finish

Choix de l'image système

Virtual Box Configuration


System Image

Select a system image

Recommended x86 Images Other Images

Release Name	API Level	ABI	Target
Tiramisu	33	x86_64	Android Tiramisu (Google APIs)
Sv2	32	x86_64	Android 12L (Google APIs)
S	31	x86_64	Android 12.0 (Google APIs)
R	30	x86	Android 11.0 (Google APIs)
Q	29	x86	Android 10.0 (Google APIs)
Pie	28	x86	Android 9.0 (Google APIs)
Oreo	27	x86	Android 8.1 (Google APIs)
Oreo	26	x86	Android 8.0 (Google APIs)
Nougat	25	x86	Android 7.1.1 (Google APIs)
Nougat	24	x86	Android 7.0 (Google APIs)
Marshmallow	23	x86	Android 6.0 (Google APIs)
Lollipop	22	x86	Android 5.1 (Google APIs)

R



API Level
30

Android
11.0

Google Inc.

System Image
x86

We recommend these images because they run the fastest and support Google APIs.

Questions on API level?
See the [API level distribution chart](#)

Previous **Next** Cancel Finish

Paramétrage avancé de la device

The screenshot shows the 'Verify Configuration' window for an Android Virtual Device (AVD). The window title is 'Virtual Device Configuration' and the subtitle is 'Android Virtual Device (AVD)'. The configuration is for a 'Nexus S' device with 'Android 11.0 x86'.

Verify Configuration

- AVD Name: Nexus S API 30
- AVD Id: Nexus_S_API_30
- Device: Nexus S (4.0 480x800 hdpi)
- OS: R (Android 11.0 x86)
- Startup orientation: Portrait (selected), Landscape
- Camera: Front: Emulated, Back: VirtualScene
- Network: Speed: Full, Latency: None
- Emulated Performance: Graphics: Automatic, Boot option: Quick boot (selected), Multi-Core CPU: 4
- Memory and Storage: RAM: 343 MB, VM heap: 48 MB, Internal Storage: 800 MB, SD card: 512 MB

Graphics Rendering

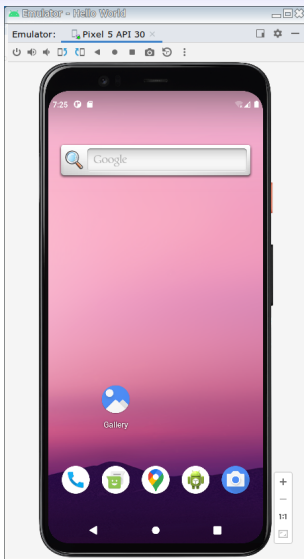
Choose how the graphics should be rendered in the emulator.

Hardware
Use your computer's graphics card for faster rendering.

Software
Emulate the graphics in software, use this to work around issues with your computer's graphics card.

Buttons at the bottom: Previous, Next, Cancel, Finish.

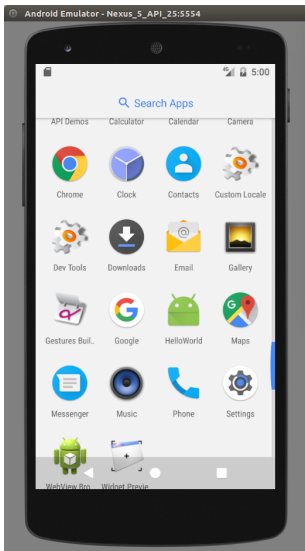
Start →



Exécution du projet sur l'AVD



L'application est maintenant disponible sur la cible (virtuelle ou non)



Résumé global

- La technologie Android :
 - Noyau Linux
 - Programmation **Java** / Kotlin
- Programmation Android
 - des outils pour le développement : SDK manager / AVD / un IDE.
 - une structure de projet standardisée (manifest, src, res, etc.)
 - des dispositifs pour le déploiement (virtuels et réels)